

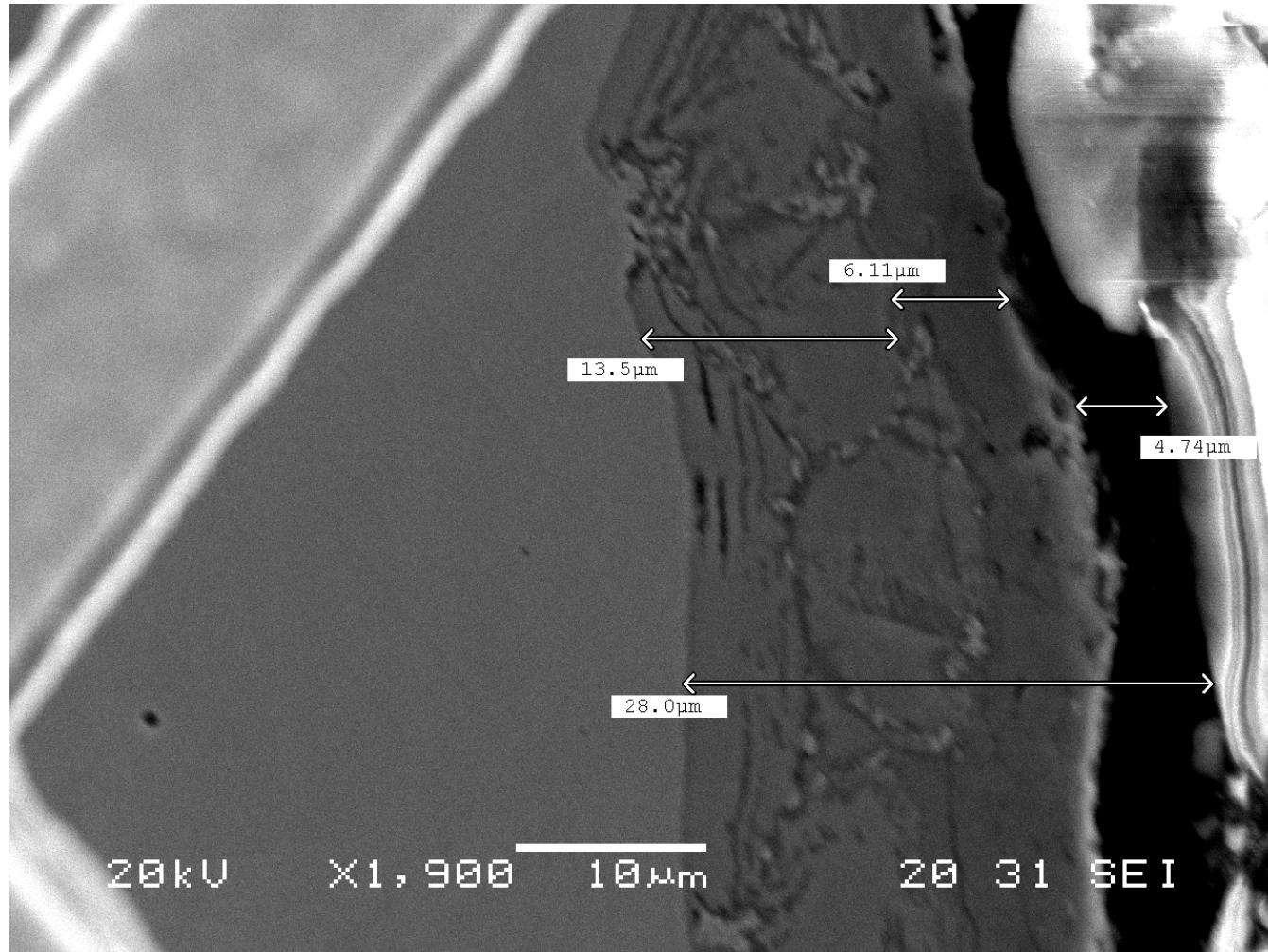
# **The Corrosion of Stainless Steel by Lead Bismuth Eutectic: Surface Effects**

Allen Johnson and John Farley  
University of Nevada, Las Vegas

# Outline

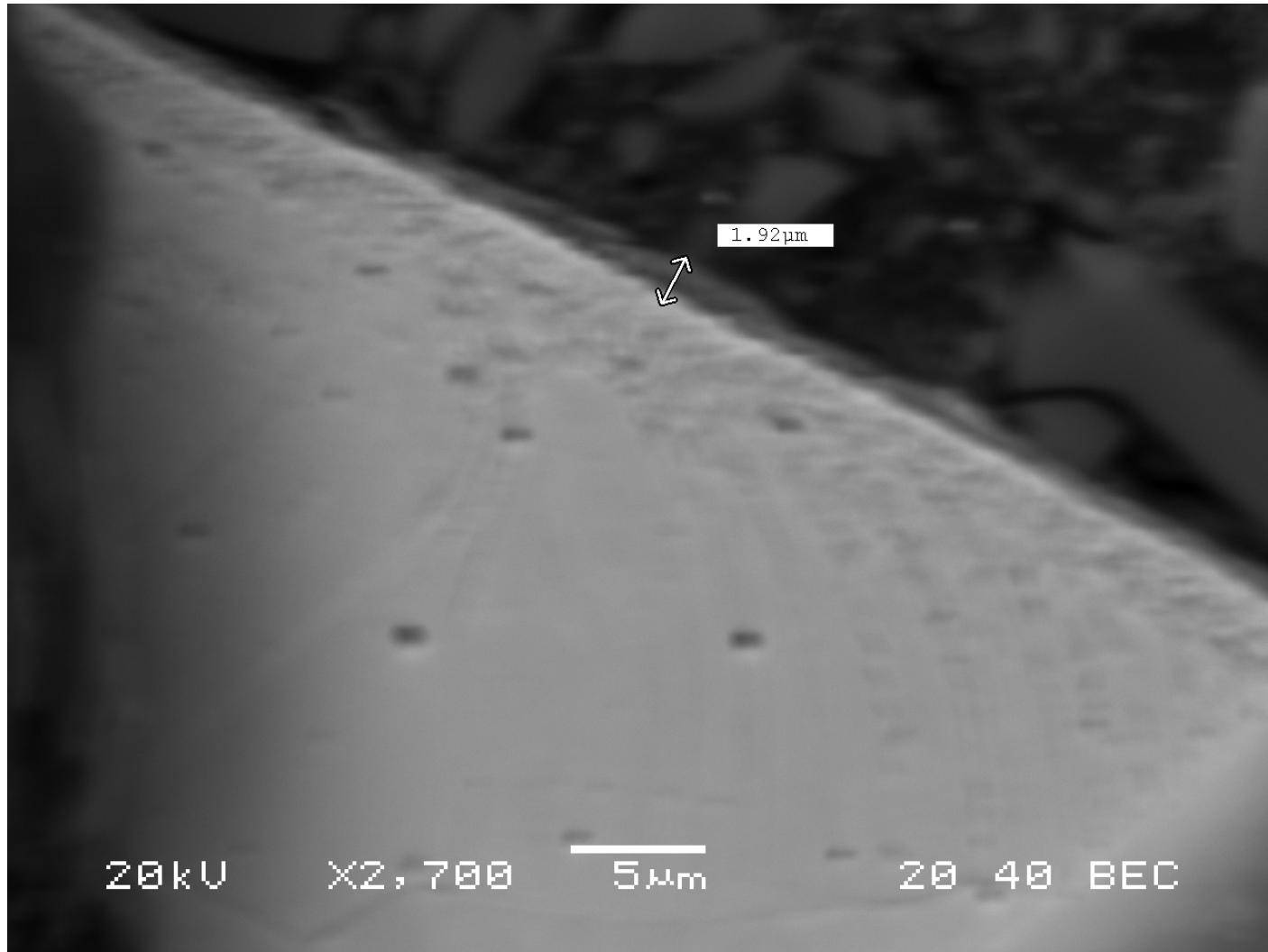
- Introduction
- SEM and EDAX results for 316L
- XPS depth profiles
- Other studies, future plans
- Acknowledgements

# SEM image of 316L annealed



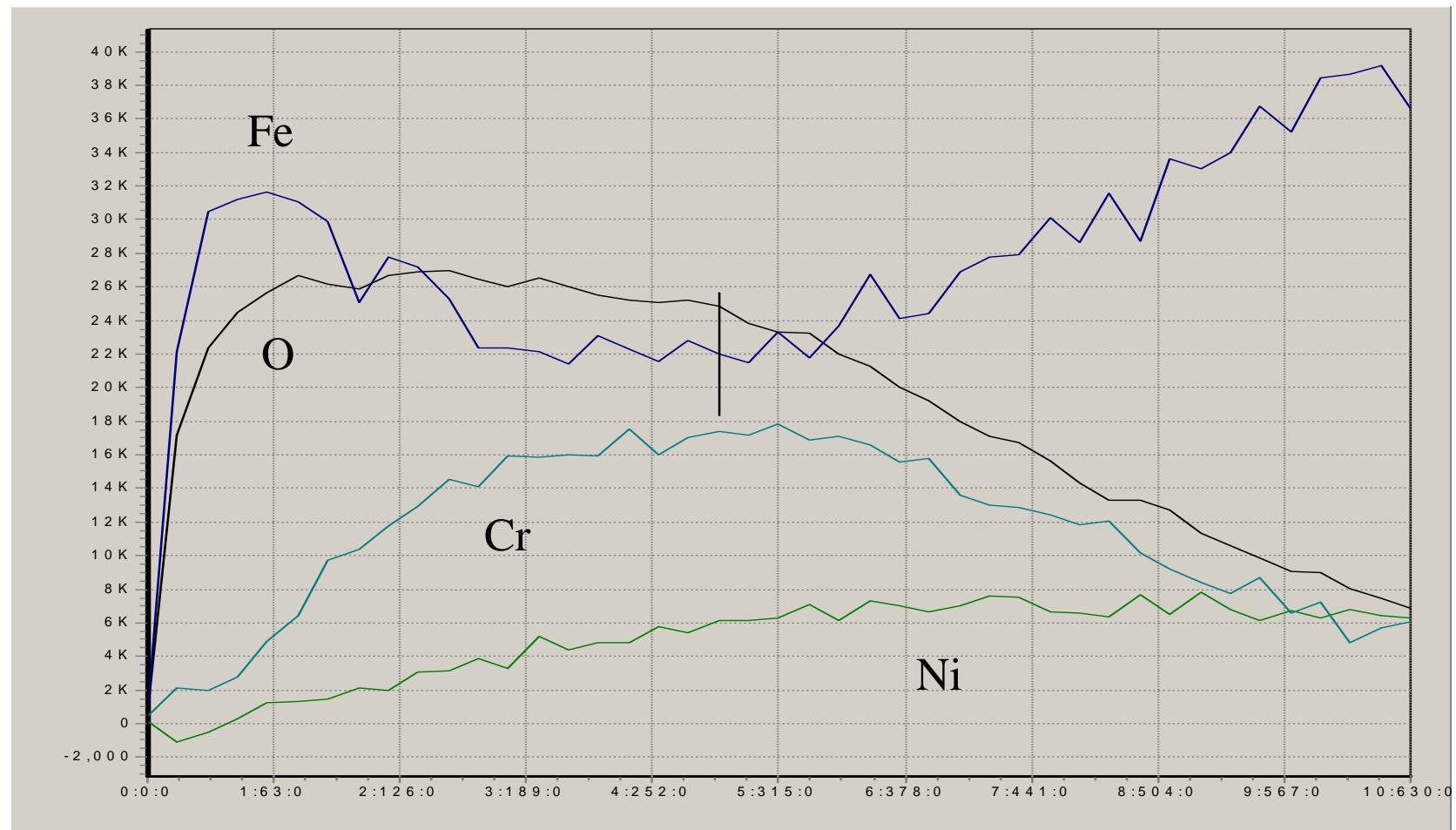
note thick, complex oxide

# SEM image of 316L cold rolled



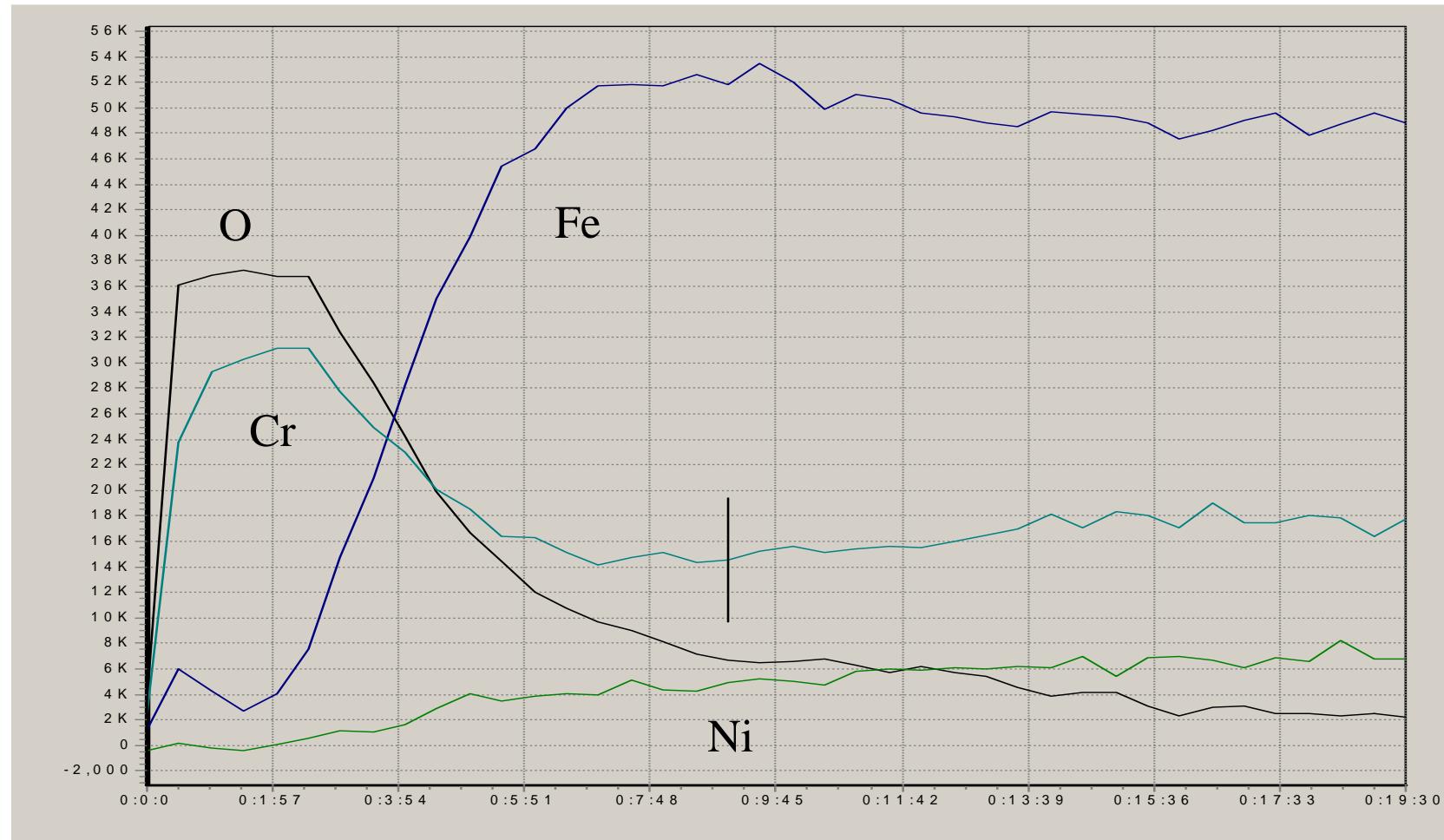
Note the thin, simple oxide

# XPS depth profiles 1



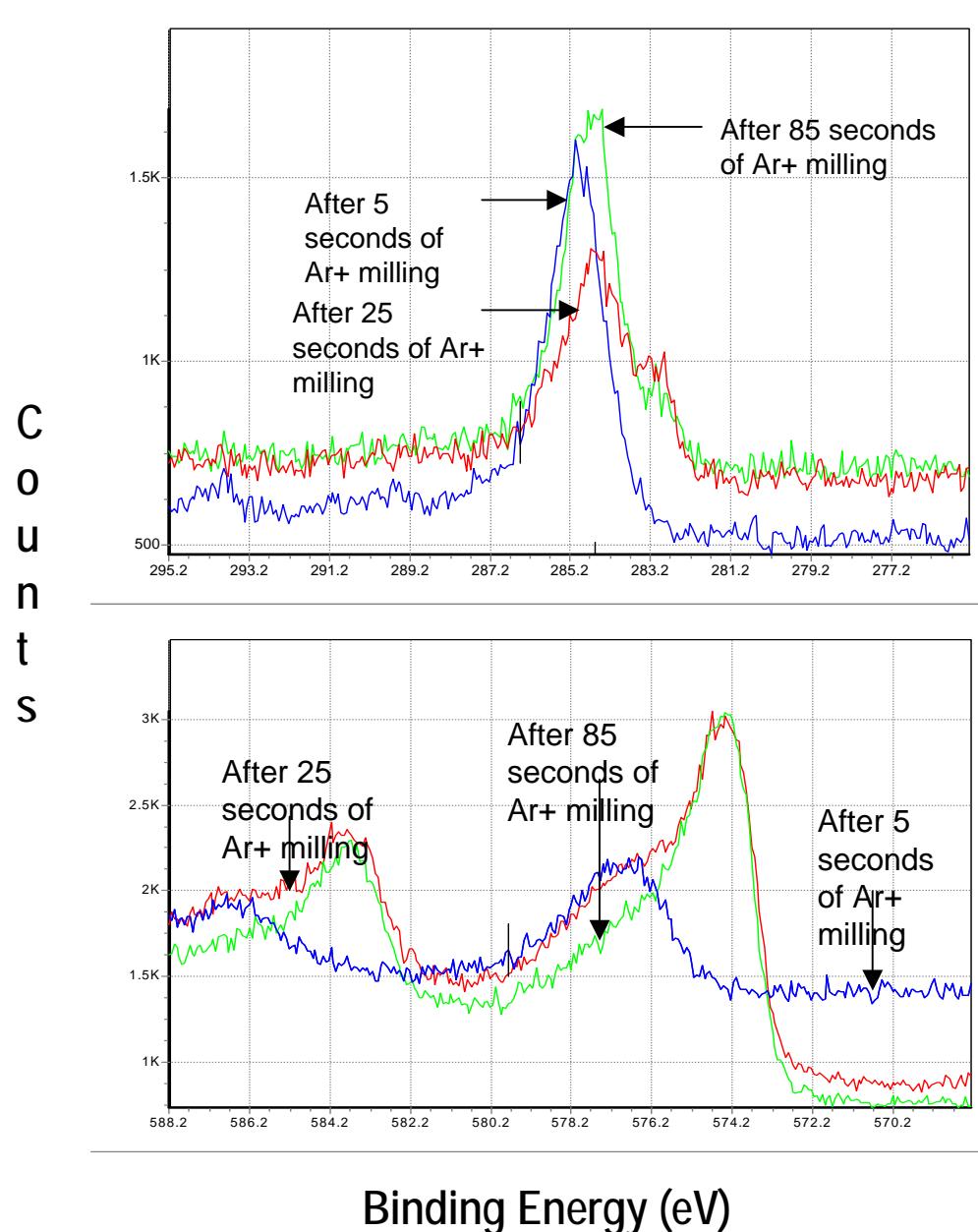
XPS depth profile of 316L annealed stainless steel exposed to LBE for 1000 hours at 823 K. Note enhancement of iron and oxygen at the surface and the depletion of chromium.

# XPS depth profiles 2



XPS depth profile of 316L cold rolled stainless steel exposed to LBE for 1000 hours at 823 K. Note that the initial chromium oxide surface is preserved over the metal surface. Only a small amount of surface iron oxide is present.

# Cold rolled 316L, initial state



Cold rolled material shows no carbide at surface, annealed material does.

Cold rolled material show chromium oxide at surface, annealed material does not.

# Other studies, future plans

- Raman in progress, FTIR planned
- XRD started (UNLV and Argonne)
- Work at EMSL
- Microscale experiments to study:
  - Short time behavior
  - Surface preparation effects
  - Methods of oxygen control

# Acknowledgements

Dale Perry of LBNL, Ning Li of LANL, and Don Baer of EMSL.

This work is funded through the University of Nevada, Las Vegas Transmutation Research Program administered through the Harry Reid Center for Environmental Studies (U. S. Department of Energy Advanced Fuel Cycle Program Grant No. DE-FG04-2001AL67358).